UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/545,597	04/07/2000	Richard W. Citta	7165	9955

7590   09/14/2006

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EXAMINER
WANG, TED M

ART UNIT	PAPER NUMBER
2611	

DATE MAILED: 09/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/545,597	CITTA ET AL.
	Examiner	Art Unit	
	Ted M Wang	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____ .

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-93_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☒ Claim(s) _65-93_ is/are allowed.

6) ☒ Claim(s) _1-5,7-13,33-37,63 and 64_ is/are rejected.

7) ☒ Claim(s) _6,14-32 and 38-62_ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____ .

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _4_ .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

1.   Claims 1-93 are pending in the application.

Drawings

2.   The drawings are objected to because on Figure 13 the output of the paths 170_{n-2}, 170_{n-1}, 170_n, 170_{n+1}, and 170_{n+2} should be listed consistently between the post-processors (elements C_ns) and adder 172. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3.   The disclosure is objected to because of the following informalities: on page 36 line 1 "Figure 6" should be "Figure 11", and on page 39 line 15 floating number "46" appeared, and on page 41 line 4 "shown as Figure 2" should be added next to "a converges 7", and on page 43 line 11 "second finite filter 28" should be changed to "second finite filter 24", and on claims 10 and 11 "method of claim 11" should be changed to "method of claim 9".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a

person having ordinary skill in the art to which said subject matter pertains.
Patentability shall not be negatived by the manner in which the invention was made.

5.   Claims 1, 3-5, 7-13, 33-34, 36-37, 63-64 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Sommer et al. (PT6, 240,133 B1) in view of Citta et al.

(PT6,442,221 B1).

  □   In regard claim 1, Sommer et al. discloses a high stability fast tracking adaptive

        equalizer for use with time varying communication with a method of equalizing a

        signal that shift data in each input block of data to the left (Fig. 4 element 70, and

        column 10 line 59 – column 11 line 3); complex multiply each of the left shifted input

        block of data by a set of equalizer coefficients to provide respective first adjusted

        output blocks of data (Fig. 4 element 72, and column 11 lines 12-15); shifting the

        data in each input block of data to the right (Fig. 3 element 50, and column 10 lines

        22-34); complex multiply each of the right shifted input block of data by a set of

        equalizer coefficients to provide respective adjusted output block of data (Fig. 3

        element 52, and column 10 lines 43-47) and the outputs of four (4) or more

        equalizers can be added by a summer (Fig. 2 elements 32 and 36, and column 8

        lines 29-52). Sommer et al. fails to specifically teach that an adjusted output blocks

        of data without shifting each of the input blocks of data and complex multiplying by a

        set of equalizer coefficients can be included in the disclosure.

        Citta et al. teaches an equalizing method without shifting any input data for a

        communication system to eliminate ghost (Fig.3, and column 2 lines 14-36).

It would have been obvious to one of ordinary skill in the art at the time of the

invention to modify Sommer's equalizing method in view of Citta's disclosure in

order to eliminate ghost.

- ❑ In regard claim 3 and 4, the limitation can further be taught by Sommer et al. in Fig.

   2 elements 30, 38, and 40.

- ❑ In regard claim 5, the limitation of g1 to g10 can further be taught by Sommer et al.

     - g1: Fig. 2 element 38,

     - g2: Fig. 4 element 72, and column 11 lines 12-15,

     - g3: Fig. 4 element 70, and column 10 line 59 – column 11 line 3,

     - g4: Fig. 3 element 50, and column 10 lines 22-34,

     - g5-g10: Fig. 2 elements 16, 38 and 40.

- ❑ In regard claims 7 and 10, the limitation that the reference is a training signal can

   further be taught by Sommer et al. in column 2 lines 60-67.

- ❑ In regard claims 8 and 11, the limitation that the reference is sliced data can further

   be taught by Sommer et al. in Fig. 2 element 40 and column 8 lines 54-59.

- ❑ In regard claim 9, the limitation of g1 to g9 can further be taught by Sommer et al.

     - g1: Fig. 2 elements 34, 38, and column 8 lines 43-49,

     - g2: Fig. 4 element 70, and column 10 line 59 – column 11 line 3,

     - g3: Fig. 3 element 50, and column 10 lines 22-34,

     - g4-g9: Fig. 2 elements 16, 38 and 40.

- ❑ In regard claim 12, the limitation of g1 to g9 can further be taught by Sommer et al.

     - g1: Fig. 4 element 72, and column 11 lines 12-15,

- g2: Fig. 4 element 70, and column 10 line 59 – column 11 line 3,

- g3: Fig. 3 element 50, and column 10 lines 22-34,

- g4-g9: Fig. 2 elements 16, 38 and 40.

□ In regard claim 13, the limitation of g1 to g9 can further be taught by Sommer et al.

- g1: Fig. 4 element 70, and column 10 line 59 – column 11 line 3,

- g2: Fig. 3 element 50, and column 10 lines 22-34,

- g3-g8: Fig. 2 elements 16, 38 and 40.

□ In regard claim 33 and 64 the limitation can further be taught by Citta et al. in Fig. 3 and Fig 5, and column 2 line 34 – column 3 line 3.

□ In regard claim 34, Sommer et al. discloses an equalizer with n - 1 data shifters wherein each of the n - 1 data shifters shifts the blocks of data (Fig.1 element 50 and Fig.4 element 70); and wherein n > 2 (Fig. 2 elements 32 and 36); an adder arranged to add outputs from the n equalizers (Fig 2 element 54); and, a controller (Fig.2 element 30). Sommer et al. fails to specifically teach that a finite filter can be included in the multi-path FFE and DFE equalizers.

Citta et al. teaches that an FIR filter can be included in a time domain equalizer to get a higher data rate (column 1 lines 58-64).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Sommer's equalizer in view of Citta's teaching in order to get a higher data rate.

□ In regard claim 36, the limitation can further be taught by Sommer et al. in Fig.2 elements 16, 30 and 38.

- In regard claim 37, the limitation of the comparator can further be taught by Citta et al. in Fig.9 element 56 and column 6 line 51 – column 7 line 51.

- In regard claim 63, the limitation of n greater than 4 (n > 4) can further be taught by Sopmmer et al. in Fig. 2 elements 32 and 36, and column 8 lines 29-52.

6.   Claims 2 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sommer et al. (PT6, 240,133 B1) in view of Citta et al. (PT6,442,221 B1) and further in view of Rainish (PT6,104,769).

- In regard claim 2, Sommer et al. and Citta et al. disclose all limitation as described in claim 1 except specifically teaching the step of estimating channel. The explanation of all the limitation is already addressed in the above paragraph. Rainish discloses a method for acquiring and tracking the sampling phase of a signal with the step of channel estimating (Fig. 3 elements 108, 118, and 124) to improve the acquiring and tracking the sampling phase of the signal with inter-symbol interference (ISI).
It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Sommer's and Citta's equalizing method in view of Rainish's teaching in order to improve the acquiring and tracking the sampling phase of the signal with inter-symbol interference (ISI).

- In regard claim 35, Sommer et al. and Citta et al. disclose all limitation as described in claim 34 except specifically teaching that a channel estimator can be included in the equalizer. The explanation of all the limitation is already addressed in the above paragraph.

Rainish discloses an apparatus for acquiring and tracking the sampling phase of a

signal with an equalizer and a channel estimator (Fig. 3 elements 108, 118, and

124) to improve the acquiring and tracking the sampling phase of the signal with

inter-symbol interference (ISI).

It would have been obvious to one of ordinary skill in the art at the time of the

invention to modify Sommer's and Citta's equalizer in view of Rainish's teaching in

order to improve the acquiring and tracking the sampling phase of the signal with

inter-symbol interference (ISI).

Allowable Subject Matter

7.   Claims 65-93 are allowed.

8.   The following is a statement of reason for the indication of allowable subject

matter: Because the existing art do not teach the limitation of the claims. That is, an

equalizer for processing blocks of data comprising: **a first data shifter, wherein**

the first data shifter is arranged to shift the data left by two; a second data

shifter, wherein the second data shifter is arranged to shift the data left by

one; a third data shifter, wherein the third data shifter is arranged to shift the

data right by one; a fourth data shifter, wherein the fourth data shifter is

arranged to shift the data right by two;

a first finite filter, wherein the first finite filter applies a first set of finite filter

coefficients to each of the blocks of data which have been shifted by the first data

shifter, wherein ghosts of the blocks of data are not eliminated as a result of the

application of the first set of finite filter coefficients; a second finite filter, wherein the

second finite filter applies a second set of finite filter coefficients to each of the

blocks of data which have been shifted by the second data shifter, wherein ghosts

of the blocks of data are not eliminated as a result of the application of the second

set of finite filter coefficients; a third finite filter, wherein the third finite filter applies a

third set of finite filter coefficients to each of the blocks of data, wherein ghosts of

the blocks of data are not eliminated as a result of the application of the third set of

finite filter coefficients; **a fourth finite filter, wherein the fourth finite filter applies**

a fourth set of finite filter coefficients to each of the blocks of data which have

been shifted by the third data shifter, wherein ghosts of the blocks of data are

not eliminated as a result of the application of the fourth set of finite filter

coefficients; a fifth finite filter, wherein the fifth finite filter applies a fifth set of

finite filter coefficients to each of the blocks of data which have been shifted

by the fourth data shifter, wherein ghosts of the blocks of data are not eliminated

as a result of the application of the fifth set of finite filter coefficients; an adder

arranged to add outputs from the first, second, third, fourth, and fifth finite filters;

and, a controller arranged to control the first, second, third, fourth, and fifth sets of

finite filter coefficients so that the addition performed by the adder substantially

eliminates the ghosts.

9.   Claims 6, 14-32, and 38-62 are objected to as being dependent upon a rejected

base claim, but would be allowable if rewritten in independent form including all of the

limitations of the base claim and any intervening claims.

Conclusion

10.   Reference 4,411,000, 5,838,774, and 5,844,941 are cited because they are put

pertinent to the Equalizer and ghost cancellation. However, none of references teach

detailed connection as recited in claim.

        Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Ted M Wang whose telephone number is (703) 305-0373.

The examiner can normally be reached on 8:30 a.m. - 5:00 p.m..

        If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Steven Chin can be reached on (703) 305-4714. The fax phone number for

the organization where this application or proceeding is assigned is (703) 872-9306.

        Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is (703) 306-

0377.

                                        Ted M Wang
                                        Examiner
                                        Art Unit 2634

Ted M. Wang

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APR 0 7 2005

DIRECTOR OFFICE
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In re Application of
CITTA, RICHARD W., et al.
Application No. 09/545,597
Filed: April 7, 2000
For: **MULTIPATH GHOST ELIMINATING
EQUALIZER WITH OPTIMUM NOISE
ENHANCEMENT**

DECISION ON PETITION
TO WITHDRAW HOLDING OF
ABANDONMENT

This is a decision on the Petition for Withdrawal of Abandonment, filed October 27, 2004, requesting the holding of abandonment be withdrawn in the above-identified application.
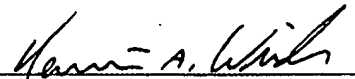
This application was held abandoned for failure to timely respond to the Office action mailed December 18, 2003. A Notice of Abandonment was mailed October 4, 2004.

A review of the record indicates that a correspondence address change was filed prior to the Office action mailed December 18, 2003 but not matched with the file. A copy of the address change was filed with the petition. Included is a copy of a post card receipt evidencing an original receipt date of July 9, 2001. The Office action was mistakenly mailed to a previous correspondence address resulting in an irregularity in mailing.

In view of the above stated reasons the holding of abandonment is withdrawn.

The petition is **GRANTED**.

Due to the time lapse between the original mailing of the Office action of December 18, 2003 and the mailing of this decision, the application file is being returned to the examiner for appropriate action including updating the search as necessary prior to the mailing of a new Office action.

Kenneth A. Wieder
Special Program Examiner
Technology Center 2600
Communications

need to remail this office action to the applicant.

TKS

Ted 9/7/05